

# REPORT DOCUMENTATION PAGE

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13. ABSTRACT (Maximum 200 words) An automated axial-torsional materials testing system has been acquired under a DoD Equipment grant to expand the capabilities for research in environmentally assisted fracture and mechanical behavior of materials. The system is capable of applying $\pm 20,000$ lb. axial force and $\pm 10,000$ lb-in. torsion under computer control, and provides for online digital data acquisition. To supplement the DoD Grant, additional funds have been obtained to add a hydraulically operated axial-torsional specimen grip, slow-rate servovalve, and heating system for high-temperature testing. The entire system is expected to be in operation by June 1986.					
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22 January 1986

TO: Air Force Office of Scientific Research  
Bolling Air Force Base  
Washington, DC 20332

Attention: Dr. Alan Rosenstein  
AFOSR/NE

FROM: Dr. Robert P. Wei  
Department of Mechanical Engineering and Mechanics  
Lehigh University  
Bethlehem, PA 18015

SUBJECT: Final Report - DoD Equipment Grant  
AFOSR-84-0227  
"Facility for Research in Environmentally Assisted  
Fracture and Mechanical Behavior"

We are submitting herewith our final report for the DoD Equipment Grant under Grant No. AFOSR-84-0227.

The grant funds permitted Lehigh University to acquire an automated axial-torsional materials testing system and thereby expanding the capabilities for research in environmentally assisted fracture and mechanical behavior of materials. Specifically, the following items were requested in the original proposal:

1. MTS Systems Corporation Model 809.20 Automated Axial-Torsional Materials Testing System (Capacity: 20,000 lb. axial load & 10,000 lb-in. torsional load), with a dedicated PDP 11/23-Plus micro-computer and associated peripheral equipment.
2. Graphics terminal and associated software.
3. Elevated temperature axial-torsional specimen grips.
4. Auxiliary equipment: oscilloscope, data display, X-Y recorder, function generator, servovalve system for low rate tests.
5. Dual density cartridge discs with controller.
6. Radiant furnace with controller.
7. Operator/programmer training

The grant provided Lehigh with \$140,000 towards the purchase of item 1, with a budgeted price of \$210,875 and a revised quotation of \$212,322. Lehigh University agreed to provide cost sharing of \$31,650, and appropriated an additional \$7,600 for electrical and other services. With manufacturer's considerations, its willingness to unbundle the computer and associated hardware from the system, availability of lower cost version of graphics systems, and consideration by Digital Equipment Corporation, the system (including item 2) was acquired for a cost of about \$180,000 (including shipping and installations).

The system was received at the end of August 1985, and was accepted near the end of October. It is located in the Sinclair Laboratory and is in operation.

To supplement the DoD Grant, a proposal was submitted to the National Science Foundation for the additional items on the initial request (with Professor Terry Delph as Principal Investigator). This request has been approved and funding has been received for an axial-torsional specimen grip, low-rate servo-valve, and heating system for high temperature testing. It is anticipated that orders for these items will be placed by early February, and the full capabilities of the entire system will be available this summer.

We take this opportunity to express our appreciation for DoD support of this significant improvement in Lehigh's research facilities, and the attendant improvement in the educational opportunities for our graduate and undergraduate students.

*Robert P. Wei*  
Dr. Robert P. Wei

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